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ABSTRACT

This paper provides background information on the goals, application process, and funding of the Ohio SchoolNet Plus initiative. Through SchoolNet Plus, school districts are allocated funds to provide one computer workstation for every five children in grades K-4, as well as funds for software and professional development for teachers. Since the equipment standard for the machines to be purchased with SchoolNet Plus funds must be high-end versions of either Macintosh or Windows 95, the initiative affords exciting possibilities for visual experimentation and visualization experiences. For some teachers and learners, the technology tools will simply enhance visual presentation or expression rather than explore visualization or generate explicit ideas about extracting meaning from different visual forms. Reflection on the creation of these presentations, however, may still accomplish visual literacy objectives. It will be interesting to see if adding visual literacy experiences to classroom times which usually emphasize traditional literacies will prove useful in the development of learners' abilities. There are innumerable opportunities for the development of visualization experiences, including the modelling of mental rotations, animations which illustrate complex processes, and visual transformations such as going from perspective views to orthographic ones. Image processing software allows inquiry into science and mathematics topics through the use of image transformations. At this point, substantial research is still needed to ascertain what strategies, materials, and purposes are the most powerful foci for increasing visual literacy. (AEF)

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An Opportunity For Visual Literacy In The K–4 Classrooms Of Ohio

By Colleen M. Sexton and John C. Belland

Abstract

The Ohio SchoolNet Plus initiative provides $400,000,000.00 to transform K–4 public classrooms in Ohio with computers, software and professional development. This dramatic change affords the opportunity to introduce visual literacy concepts into primary education. Some preliminary efforts have been made, but substantial additional work remains to be done.

Scenario

On Tuesday morning, the third grade students in Ms. A's room were clumped about the room, some around a white board, some madly scribbling on paper, and others gathered around a computer monitor. This was not a special morning but rather typical of the kind of work the children in Ms. A's class do. The project for the past few days was to prepare an electronic program for the school's Spring Dinner Theater. The students that were collaborating with a group of sixth graders who produced the printed play program, were gathered around the white board refining their interview questions for the student actors in the play. The group scribbling on papers were brainstorming possible layouts for their electronic program. Cooperation among all by accepting and listening to each other's ideas brought forth a creative layout design that morning. The group around the computer monitor were actively engaged in a discussion about a drawing created by one of the students using drawing software on the computer. Communicating their ideas, listening to one another, and sharing constructive comments led to the creation of a beautiful opening page for their electronic play program. By opening night the students had created a Hyperstudio document with buttons that led to a separate page about each student actor or helper involved in the play. As guests entered the school, waiting for their table, they could sit at one of the four computers set up in the hallway, go through the Hyperstudio stacks, and read about the evening's performers.

What indicators of success could Ms. A identify through projects such as these? While the end product has value in teaching particular concepts within given disciplines, skills typically learned though not planned for arise. Ms. A believes it is important to eliminate this hidden curriculum and to openly plan for and create opportunities where lifelong learning skills can be fostered. Projects such as the electronic play program provided students the opportunity to collaborate by recognizing that one can learn from the experiences others bring to the learning environment. Cooperative skills which are necessary to come to group consensus on particular concepts were emphasized in this project. They enhanced the interactive experiences, decreased competitiveness, and promoted a more collaborative view of learning. Communication skills grew as the students clearly articulated their ideas and understandings of the work done by others.

Ms. A believes that all of her students can learn, that each may not learn the same way or the same things, and that it is important to give each student a variety of opportunities to demonstrate how he or she is smart. She tries to provide experiences that are meaningful to the learner, to encourage the student to make real decisions, and to provide the students opportunities to refine their thinking and deepen their understanding of a concept. This occurs by developing understandings of concepts within real world contexts so that each student constructs her or his understanding of the concept by direct experiences. This constructivist philosophy of learning underpins each experience Ms. A shares with her third grade students.

Wouldn't it be wonderful if Ms. A were cloned; that all children could be actively engaged learners; that all classrooms were learning environments that used multiple tools to assist learners in creating richer understandings of concepts; that communication among learn-

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ers was increased so that teachers could listen for misconceptions; and where all learners could have quick access to current information. A strong desire to create these powerful learning environments exists among many of the stakeholders involved in education in Ohio.

SchoolNet Initiatives

The initial catalyst for this dramatic change was a program known as SchoolNet. The SchoolNet initiative enables every classroom within school buildings to be networked for voice, video, and data access. The school districts identified as "low wealth districts" by the state also receive a workstation for each of their classrooms. The SchoolNet funding, however, does not address the need for connectivity between participating schools. It is the responsibility of individual districts to support this connectivity.

An extension of SchoolNet was a focus on K-4 learners called SchoolNet Plus. It is believed that exposure to computer technology during the primary grades will promote lifelong learning habits that will follow a child throughout their formal years of schooling and beyond. Through this initiative school districts were allocated funds to provide one computer workstation for every five children in grades K through 4, provide appropriate software, and conduct professional development for teachers. To date out of the 611 school districts within Ohio, 578 districts have applied for SchoolNet funding and well over 550 of these are actively moving forward with their plans for implementing the computer technology into their teaching and learning environment.

The SchoolNet Plus initiative is not strictly about hardware. It is designed to create learning environments such as the one provided by Ms. A. Any school district applying for their SchoolNet Plus allocation must have in place a technology plan. This plan should reflect the philosophy which underpins the use of technology in the classroom. Each district is required to complete an application which paints a picture of how they see their philosophy being put into practice. School districts are asked to explain how they believe: technology can be a catalyst for change, how the student's role will be different, how the teacher's role will change, how the use of technology in the classroom fits into the district's continuous improvement plan, and how they describe a technology-rich learning environment. Districts are asked to describe the kinds of things that will be happening in the classroom as a result of the addition of computers, and most importantly to describe their present benchmarks and their future indicators of success.

School districts are encouraged to think "outside of the box" with this application, while raising proficiency scores is an important indicator of success for educators in Ohio, one must ask if it is the only measure? Placing a computer in a classroom may make a student more efficient. It can provide access to multiple resources previously not available. It can assist with communication skills, and so on and so on, but that alone will not raise test scores. Lifelong learning skills, like those fostered in Ms. A's room, are more readily achievable goals that ultimately can impact on increasing proficiency scores.

Of course to reach such goals, Professional Development is of vital importance. The SchoolNet Plus initiative allows school districts to make decisions on how to spend their allocation. They are strongly encouraged to divide their funds among hardware, software, and professional development. Conditions within some school buildings prompted the legislators to allow school districts to apply up to 10% of those dollars toward electrical wiring upgrades.

Professional development can come in many forms. Some districts are opting for the initial quick fix, teach teachers how to turn on the computer, how to use various software applications, and what to do when minor problems arise. The thinking along these lines tends to be, get them on technology first, get them comfortable with it, then we'll worry about how to integrate it into the classroom. Another group believe in one-stop shopping—give your allocation to a vendor who will provide hardware, training, and a packaged curriculum with varying degrees of adaptability to the existing curriculum. This quick fix eliminates the multitude of decisions that must be made when integrating technology into the curriculum effec-

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tively. The benefits and downsides of this decision are a subject for a doctoral dissertation. A third approach to professional development has been a combination of technology and philosophy; training on the hardware, reflective and thought provoking discussions about software purchases, and cooperative development of lessons designed to integrate new tools into the teaching and learning environment.

The SchoolNet office has supported a variety of training opportunities within regional communities throughout the state. Local decisions guided the types of professional development opportunities during the Summer of 1996. During the 1996–97 school year, regional SchoolNet Faculty are supported throughout the state with the charge of assisting districts with technology-related concerns and creating opportunities for teachers to become more effective in integrating technology into their teaching. Teachers within districts throughout the state are taking part in team action research projects with additional state funding to study the impact technological applications have on their learning environment. The SchoolNet office entered into a contract with the Eisenhower National Clearinghouse for Science and Mathematics resources to co-develop with local teachers a template for evaluating K-4 science and mathematics software, to train representative teachers from each region of the state on how to use the template, and to work with that trained group to evaluate the software available to the Clearinghouse. The results of those evaluations are found on a web site sponsored by the Clearinghouse and designed to call up entries from a variety of categories. The trained teachers are charged with either creating opportunities to train additional teachers within their district on how to use this template to evaluate mathematics and science software, or they can charge individual school districts to provide this service for them as the district begins to make decisions on software purchases with their SchoolNet Plus dollars.

The SchoolNet Plus initiative is moving into its second round of funding. Initially the state allocated $122 million dollars for the districts to be distributed at $171.79 per K-4 ADM (average daily membership, equivalent to enrolled students). The second round of funding is for $150 million. An additional $125 million is expected in future allocations. The first round of dollars were available to all school districts, the legislation for the second round targeted 459 out of 613 districts based on the following criteria: 1) have an FY95 adjusted valuation per pupil below $110,000 and an FY94 adjusted expenditure per pupil below $5,218, 2) have an FY96 total ADM of at least 9000 and an FY95 ADC percent of at least 18%, or 3) have an FY95 adjusted valuation per pupil below $60,000. Non-targeted districts are expected to provide a dollar for dollar match to access their funds. To assist non-targeted districts, we have defined a match as any money spent by the district since the SchoolNet Plus legislation was enacted. So long as they can demonstrate that they have spent a given amount of money they can receive an equal amount not to exceed their identified allocation.

As we move into the second round of funding, we want to obtain a clear picture of where each district is in moving their technology plan forward. To this end, we have designed the second round application to be an accounting of where each district is, what is happening in individual K-4 buildings within the district, and where the K-4 teachers are in their skills with technology and in applying them in their classroom. It would be ideal if all districts could simply pull the application off of our web site or from the special list server we have set up to field SchoolNet Plus questions and concerns. However, until all have access we've opted for sending each district a disk with the questionnaire on it. The district liaison, typically the technology coordinator, will complete one section; each K-4 building principal will electronically complete a second section; and each K-4 teacher will be asked to complete a questionnaire on an electronically-read response sheet. These data will provide an understanding of how the first year monies were distributed among hardware, software, staff development, and electrical upgrades, as well as provide a baseline for comparison once future allocations for SchoolNet Plus are appropriated by the legislature.

We are convinced that technology can be a catalyst to invigorate the learning environment. Rich powerful learning experiences can be created through proper implementation of multimedia tools. The SchoolNet Plus legislative initiative in Ohio may state that schools must strive for a 1 to 5 computer to student ratio, but while reaching that goal we've created something much more dynamic. The computers create a physical presence which can not be ignored A presence, that when properly used, can develop and enhance lifelong learner skills for all learners regardless of age.

Implications—Visual Literacy

Just because there is an enormous infusion of technology into kindergarten through fourth grade in every public classroom in Ohio, this does not necessarily mean that any attention will be given to visual literacy. In fact, in some situations, the policy-makers in local districts have chosen to purchase so-called integrated learning systems which focus on the tutorial presentation and drill/practice of very traditional curriculum content in the form of compartmentalized knowledge. However, since the equipment standard for the machines to be purchased with SchoolNet Plus funds must be high-end versions of either Macintosh or Windows 95 machines (the processor speeds must be above 100 MHz, include a CD-ROM drive, and must have the PCI-bus architecture), these machines afford exciting possibilities for visual experimentation and visualization experiences.

Art objectives

For some teachers and learners, the technological environment will simply provide a new set of tools to use to be expressive in the visual realm. In these settings, the goals will be more oriented to artistic expression rather than explorations in visualization or generating explicit ideas about extracting meaning from different visual forms. Of course, if teachers and students reflect on the creative process used in generating the art and if they use critiques to encourage understanding of the pubic knowledge creation which can be associated with works of art at any level, then those visual literacy objectives which focus on producing and understanding images will be addressed in new and interesting ways.

For example, in the example provided above, Ms A's students used drawing and painting software to generate art to be used for the school's upcoming dramatic activity. It would be interesting to examine how the creation of art differs when executed on the computer as opposed to traditional tools available to primary-grade learners (Fein, 1993). In addition, if a scanner were available, it would be interesting to study just how young learners began to combine media in the computer workspace and to evaluate how the resulting images functioned in the school and personal lives of these learners.

Literacy objectives

During the time in school when traditional literacies are emphasized in the curriculum, it will be interesting to see if adding visual literacy experiences will prove useful in the development of learners' abilities. For example, will creating electronically based, illustrated stories increase the meaning young learners derive from written and spoken language. Can learners experience the idea that the images drawn by an adult to illustrate a story are only one possible alternative in visualizing the meanings of the story? What kinds of special meanings can only be expressed iconically? How can simple electronic photography and digital video help make meaning while encouraging self expression? What are the fundamental components of a visual language (Moriarity, 1994)? How are visual languages mediated by culture? Primary-grade learners in Ohio have access to extraordinary tools for these explorations.

Visualization objectives

There are innumerable opportunities for the development of visualization experiences with the computer platforms available to K–4 learners. Mental rotations can be externalized and modeled on the computer screen. Animations which zoom in on map details and which dynamically illustrate complex processes can be displayed under the control of the learner. Visual transformations such as from perspective views to orthographic ones can be animated as

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well so that young learners can begin to interpret diagrammatic information with fluency (Salomon, 1987). Just how these experiences will affect primary grade learners is not known, but there is work in progress by Philleo (1996) in mental rotations and location in space, and Wilkens (1996) in virtual reality which should begin to offer some understanding of the potential for these technologies. An example of Philleo's work is represented in Figures 1–3. In his work, young learners are asked to orient themselves in a representation of a school library media center. In Figure 1, the learner is looking from the outside of the media center through the door. Using animation software, the student is able to move her/himself through the door to explore the inside. Questions which ask the learner to anticipate what the layout of the media center will be using cues from the image and also from the floor plan shown in Figure three help the learner begin to comprehend differing points of view and accomplish mental rotations. Figure 2, which represents an interior view of the media center illustrates just one of the infinite number of views which learners can investigate on their computer screens. This work should build the sort of literacy which will help in orienting in space for map reading and the like.

Figure 1
VIEW FROM OUTSIDE THE LIBRARY/MEDIA CENTER

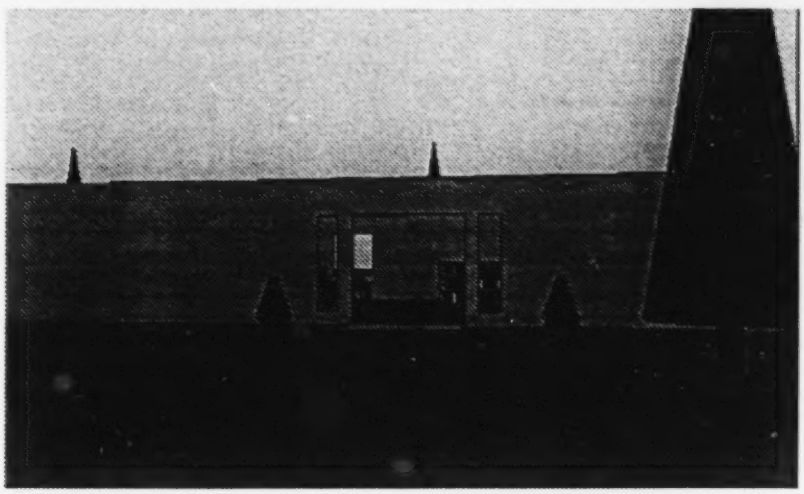

Figure 2
LEFT INTERIOR OF THE LIBRARY/MEDIA CENTER

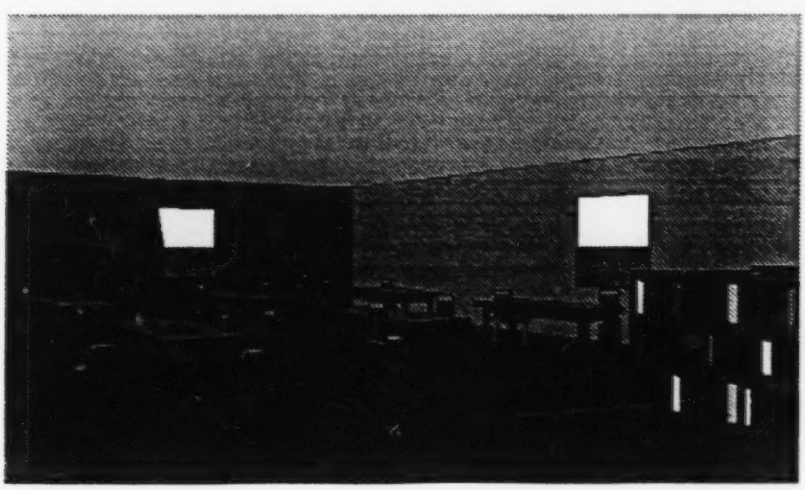

Image-processing objectives

Image processing allows inquiry into science and mathematics topics through the use of image transformations. Images which use colors to indicate elevation can be used to calculate very complicated things such as the volume of water in a pond or lake. Infrared images can be used to

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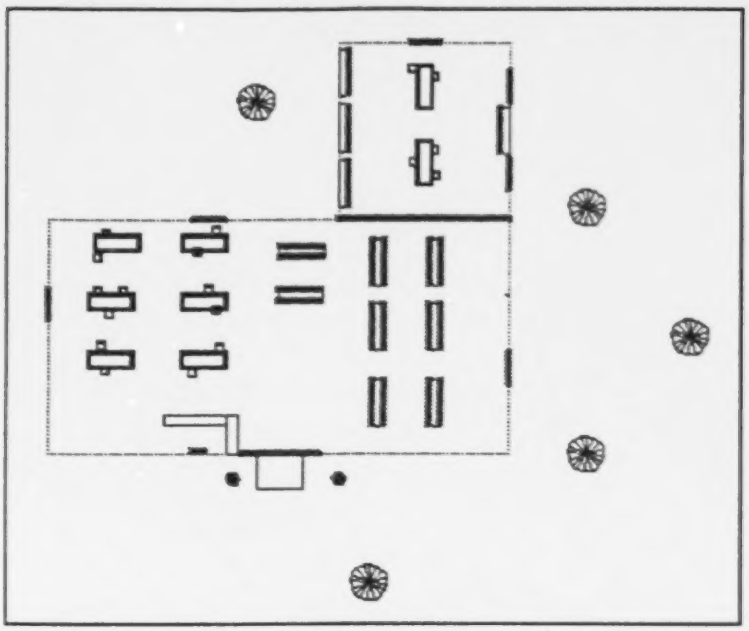
Figure 3
FLOOR PLAN OF THE LIBRARY/MEDIA CENTER



calculate energy use. Even if the objective is not calculation, imaging techniques can assist learners in separating figure from ground, finding animals in the dark, and many other things (Eisenhower Clearinghouse, 1995). User friendly image-processing software will run well on SchoolNet Plus computers. It remains to be seen whether teachers will avail themselves of the opportunities afforded by this set of techniques.

Conclusion

It is too early to tell whether the technological revolution in K–4 classrooms in Ohio will result in increased visual literacy. Substantial research and development is needed to ascertain what strategies, materials and purposes are the most powerful foci for increasing visual literacy. It is also necessary to find out what visual literacy strategies are developmentally appropriate for primary-grade learners. This paper is an invitation to all interested in visual literacy to understand the opportunity SchoolNet Plus has provided in Ohio. As this initiative is brought to life in all K–4 public classrooms in the state, there will be many ideas competing for attention as curricula are reformed to take advantage of the resources. What will visual literacy scholars contribute to this transformation?

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